A Comparison of Cross Connection Protection Requirements in Michigan and Surrounding States

Prepared by Emily Loder, Michigan State University Master of Public Policy student, with support from the Michigan Department of Environment, Great Lakes, and Energy

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Master of Public Policy
MICHIGAN STATE UNIVERSITY

This project was prompted by concerns regarding the inconsistency of existing regulatory requirements found in the Act 399 Administrative Rules and the Michigan Plumbing Code, as well as inconsistency of implementation across local jurisdictions, and builds upon previous work on backflow prevention by Michigan Department of Environment, Great Lakes, and Energy (EGLE) and the University of Michigan conducted in the summer of 2021, An Assessment of the Cross Connection Protection Requirements in the State of Michigan.

The purpose of this report was to review pertinent laws and codes and summarize the effectiveness, equity, and feasibility of Michigan's regulatory approach to cross connection control, as well as other states' efforts in this area. The contents of this report are based on the author's interpretation of responses from state employees and contractors involved in backflow prevention, who were offered an opportunity to review their respective section.

The State of Michigan hasn't done an in-depth updating of their rules for cross-connection and backflow prevention since 2008. The purpose of this report is to identify areas where Michigan's rules may be lacking and determine what could be done to make improvements. The first portion of this report is dedicated to comparing Michigan's cross connection and backflow prevention rules with the rules of other surrounding states. A group of Michigan Department of Environment, Great Lakes, and Energy (EGLE) engineers devised a questionnaire that was sent out to pertinent individuals in state government agencies within the Great Lakes and Midwest region. The questions covered regulatory specifics and differences in system types and enforcement. The full list of questions is provided in the Appendix A. Of the eleven states that were contacted for this project, eight states responded to our questionnaire and their individual identities will be anonymous for the purpose of this report. A comparison table is included in Appendix B. A review of each state's written rule sets was done for additional clarification and context. The second part of this report is an analysis of Michigan's cross connection and backflow prevention program done by industry contractors. A questionnaire was sent out to three different companies who offer cross connection and backflow prevention services to their customers in Michigan and at least one other of the states included in part one. The full list of contractor questions is available in Appendix A. All three firms responded to our questionnaire and their identities will remain anonymous.

PART I: STATE COMPARISONS

MICHIGAN

Michigan requires that all backflow prevention devices be tested a minimum of every three years, however they strongly recommend that high hazard assemblies be tested annually. Michigan's cross connection control rules also allow back flow preventers on untreated, residential lawn irrigation systems to be tested a minimum of once every 5 years. Testers in Michigan must be ASSE 5110 certified, and using Series 5000 guidelines, ASSE verifies if prospective testers meet the five years of related industry experience threshold. While a valid ASSE 5110 certification allows individuals to test in Michigan, according to a July 21, 2014 interpretation by the Michigan Department of Licensing and Regulatory Affairs Plumbing Division, only licensed plumbers can repair, relocate, or install these assemblies. Because you do not have to be a licensed plumber, the available number of available testers in the State is greater than it otherwise would be. Conversely, this could result in customers potentially having to hire a separate tester and plumber if repairs are needed, which delays the timeline for remedying any issues. All water customers are required to undergo plumbing inspections in accordance to the frequency in the approved local program, high hazard customers should be inspected annually, while all other customers should be inspected at least every 5-10 years. This inspection can be completed by water system staff or another authorized individual. Both containment and isolation are allowable strategies within Michigan, but isolation is the recommended standard. If containment is used, affected parties must be notified and educated on potential risks. Michigan requires that all water customers, including residential customers, adhere to all state cross connection and backflow prevention rules. Additionally, there are no differences in how types of community water systems (large, small, public, private, etc.) are regulated within the state of Michigan. There is no program in place for tracking backflow incidents within Michigan, but water utilities are required to report drinking water emergencies to the state which may include backflow events.

Oversight and enforcement in Michigan are done by state-level community drinking water program staff who enforce the program through sanitary surveys, routine site visits, consent orders,

fines, and the legal enforcement mechanism that utilities are required to have. Michigan does also note that while they attempt to regulate all aspects of the program, irregularities do exist. Water systems in Michigan must report cross connection control activities to the state in the form of an annual summary report. If program noncompliance is identified, the offender is given a deadline by when they are to resolve the issue. If the issue is not resolved or the instance is severe enough, other enforcement tools like Administrative Consent Orders can be utilized. There are currently regulatory gaps in Michigan's cross connection and backflow prevention program, but the state is working towards identifying and closing said gaps.

Some of the most glaring regulatory gaps in Michigan have to do with consistency. The cross connection and backflow prevention rules are inconsistent with the plumbing code, making it nearly impossible for municipalities to completely comply with both. This is an issue that was noted on site visits that occurred over the course of this project. Additionally, there are some EGLE geographic districts that are more consistent with following and enforcing cross connection and backflow prevention rules than others. Reasons for inconsistency among EGLE districts include resource shortages, staff experience/training, and district priorities. Inconsistency among program rules, enforcement, and involvement leads to less safe drinking water in the State of Michigan overall. Another big regulatory gap in Michigan has to do with residential accounts. The EGLE staff working on this project have identified the inclusion of residential accounts in a water system cross connection prevention program as a gap and have noted irregularities in the enforcement of program rules for residential accounts. Contractors have also stated that Michigan appears to be less strict with residential accounts, even though they should be held to the same standard as commercial accounts.

STATE ONE

State One has a requirement that all testable backflow devices be tested at least annually. The individuals who can perform these tests are certified plumbers who are also certified Cross Connection Control Device Inspectors (CCCDI). However certified water operators may also become CCCDI certified to test backflow preventers located in areas owned by the public water supply. State One requires all community water suppliers to conduct inspections, and inspections must be conducted by water system staff or another authorized delegate every 3 years. The inspection initially consists of a written survey, the results of the survey may require a follow-up of a physical plumbing inspection. State One does not have a system for tracking backflow incidents. State One requires that all water customers, including residential customers, follow program rules. As a general rule, State One regulates all systems including large and small, privately owned or public, etc. to the same standards.

Regarding enforcement of the program, State One actively enforces all components of the program through dedicated staff, sanitary surveys, and the requirement for water utilities to have legal enforcement mechanisms. Water systems in State One report cross connection control activities through a triannual survey. If noncompliance is discovered, enforcement may be initiated which can include monetary fines. Generally, there are no large regulatory gaps in State One's program, however budget and staffing issues may slow down the process from year to year.

In general Michigan and State One have very similar programs in terms of regulations, systems covered, and enforcement. However, State One does have stricter requirements for testing frequency. All assemblies are to be tested annually in State One, while Michigan can only recommend annual testing as the current written regulation states that assemblies must be tested every 3 years. Another key difference is in testing certification. In State One if you can test a device then you can fix it. In Michigan, for the most part, testers are not required to have certification to fix assemblies, so customers

may have to hire a tester and a separate repair person if needed. Lastly, even with State One having stricter requirements, they report being able to limit regulatory gaps and enforce all aspects of their program better than Michigan.

STATE TWO

Backflow prevention devices in State Two have to be tested at least annually by a certified backflow and cross connection control inspector. However, there is no plumbing inspection requirement in their cross connection and backflow prevention program. State Two allows containment and isolation as viable strategies and requires that affected parties be notified of duties and risks should containment be used. In regard to system types, State Two requires that all water customers, including residential, act in accordance with all cross connection and backflow prevention rules. The only difference in regulations between system types; be it large, small, private, or public is the frequency of the sanitary survey. Like Michigan, community systems go through the sanitary survey process every 3 years while non-community systems complete a sanitary survey every 5 years. State Two has no formal tracking program for backflow incidents and does not require the utility to report any such incidents to the state.

Enforcement in State Two is done through specialized staff and includes sanitary surveys, as well as legal enforcement mechanisms possessed by water utilities. All components of their program are enforced to the best of the state's ability. State Two does not require that water utilities report cross connection control activities to the state. If noncompliance is discovered, the state has the authority to disconnect the customer's water service. State Two admits that regulatory gaps do exist in their program, but hope to close the gaps in the future.

Michigan's cross connection and backflow prevention program is stricter than State Two's in general. This is mostly due to the lack of required plumbing inspections and lack of reporting duties outlined in the program of State Two. A notable difference is that assemblies are required to be tested annually in State Two, while in Michigan the written rule is that assemblies must be tested every three years. Both State Two and State One have an annual testing requirement, while Michigan does not.

STATE THREE

In State Three, backflow prevention assemblies must be tested annually and rebuilt every 5 years. The testing must be done by plumbers who are accredited as backflow testers. State Three's plumbing inspection requirements vary by location as this is not regulated by the state, but rather the municipality of the utility, and are only required specifically under the plumbing code. Informal inspections of high hazard plumbing do occur during installation or testing. The program standard is set at isolation, and they do not allow containment, but containment is likely still happening to some degree within the State. Since containment is not allowed under regulations, there are no formal disclosures of risks or duties to affected parties. All rules regarding backflow and cross connection prevention in State Three apply to all customers, including residential customers. Although, the program is not regulated at the state level. Each local government within the state has their own program with its own specific rules so not every residential customer is held to the same standards. Differences in regulation between system types (large, small, private, public, etc.) may be plentiful since each locality has its own specific set of regulations. State Three has no program for tracking backflow incidents nor do they require water systems to report backflow incidents.

State Three does not have active enforcement at the state level, enforcement is delegated to local units of government. As such, enforcement is not handled by one central group of staff. Furthermore, regulation is split between two state-level departments, and then enforcement happens at a local level. State Three utilizes the sanitary survey process for enforcement, however the enforcement in this case is self-enforcement by each individual water system. Water utilities are also not required to have legal enforcement measures in place. State Three has no requirement for water utilities to report cross connection control activities to the state. Certified testers, however, must report testing activities and device statuses to the state. Noncompliance is handled by local government and each locality may take different noncompliance actions. State Three feels their program structure is effective, but they don't have the means to help localities build up program and enforcement resources. Due to this structure, there are regulatory gaps.

Making a direct comparison between Michigan and State Three is difficult since the cross connection and backflow prevention programs are structured very differently. Since State Three's program is not successfully implemented at present, Michigan's current program is stricter and more effectively regulated. A notable difference is that State Three requires annual testing while Michigan does not. This is now the third state with an annual testing requirement. Without a formal inspection program to survey for cross-connections, State Three is likely not successful at effectively preventing backflow. State Three also requires that testers be plumbers in addition to accredited backflow testers. Michigan does not require that testers also be plumbers, a rule that can negatively affect water customers who must separately hire testers to test assemblies and plumbers to fix assemblies if needed.

STATE FOUR

Backflow prevention devices in State Four must be tested annually by testers with ASSE or ABPA certifications. Additionally, to test within State Four, all testers must certify within State Four and must be taught state-specific requirements. Additionally, there is no requirement for water customers to get plumbing inspections. The plumbing standard in State Four is set at containment and isolation can only be recommended, not enforced in any situation. Residential customers are exempt from the cross connection and backflow prevention program unless a cross connection is located. Community water systems are subject to program regulations regardless of ownership (public or private), while non-community systems are exempt from the program. State Four requires water suppliers to report when a backflow incident occurs but does not track the incidents.

Enforcement in State Four is done at the water system level, by regional offices. The state does attempt to enforce all components of the program, but some areas may fall short. Most enforcement is done through the sanitary survey process as there is no requirement for local utilities to have a legal enforcement mechanism. State Four does not require that water utilities report cross connection control activities to the state. Noncompliance can result in disconnection of water service if the customer does not resolve the issue in a timely manner. State Four identifies that their program has regulatory gaps and are working to fill those gaps.

Michigan's cross connection and backflow prevention program is stricter than State Four's in terms of individual regulations and the applicability of rules. There are no plumbing inspections required as part of the program in State Four and both residential customers and non-community water systems are exempt from the program entirely. However, even with more relaxed regulations in other areas State Four still has an annual testing requirement for backflow prevention devices while Michigan does not.

STATE FIVE

State Five has no formal requirements for testing backflow prevention assemblies, but they have a recommendation of annual testing. As there is no testing requirement, no tester credential requirements are in place. As far as plumbing inspections, none are required in State Five. The state does not allow containment as a plumbing strategy. When a cross connection and backflow prevention program is required in State Five, all aspects of the program apply to residential customers. Programs are required in systems where there is evidence that a contamination event was linked to a cross connection within the distribution system. In instances where programs are required, there are no differences in how types of systems (large, small, public, private) should be regulated. State Five does not have a method for tracking backflow prevention incidents but once an incident is known it must be reported to the state within an hour.

Enforcement in State Five is delegated to a state-level agency but there is no specialized cross connection staff. There is no statewide cross connection and backflow prevention program, but in instances where one is required enforcement is mostly through sanitary surveys and the legal enforcement measures that water utilities are required to have. In those instances where a program is required the state actively enforces all components. There are no requirements for water utilities to report cross connection control activities to the state. If noncompliance is discovered, enforcement may consist of notices, Consent Orders or Administrative Orders. State Five does note that regulatory gaps exist within their program since there is a lack of specificity within the rules.

Michigan's cross connection and backflow prevention program is more robust than State Five's on most levels. Michigan's program contains more regulation areas including testing, inspections, and a state-wide program. However, State Five recommends annual testing of all backflow devices, while Michigan only recommends annual testing for high hazard ones.

STATE SIX

Backflow prevention assemblies must be tested annually, upon repair, and upon relocation in State Six. Testers must be registered with the state and either have completed a course offered by the state, possess a ABPA or ASSE certification, or have credentials from another state with similar or greater requirements for training than State Six. There are no plumbing inspections required as part of the cross connection and backflow prevention program. Containment is a required plumbing strategy in cities of over 15,000 people in State Six, isolation is not practiced. In terms of residential customers, all residential customers must follow plumbing code and residents in cities with a cross connection and backflow prevention program should follow all program requirements. Different types of water systems are regulated differently; high hazard systems are regulated differently than low hazard systems. Systems are also regulated differently depending on size since only larger cities are held to cross connection and backflow prevention rules. State Six does not track, nor require water utilities to report backflow incidents.

Enforcement within State Six is not handled by the state since they do not have a statewide program, instead enforcement is done at a local level. As such, there are no state-level enforcement tools. The department that handles cross connections has no permitting or inspecting authority to enforce the rules of their cross connection and backflow prevention program. There is no requirement for water utilities within State Six to report any cross connection control activities to the state. Since enforcement is carried out by localities, the consequences for noncompliance may look different for

each program. There are no standard actions taken to correct noncompliance. Further, the State does not actively monitor or audit local programs. State Six recognizes that their cross connection and backflow prevention program does currently have regulatory gaps.

Michigan has a much more robust cross connection and backflow prevention program than State Six. A big difference between the states is that State Six only requires a program when a city has a population of over 15,000 and said program is containment. In Michigan, all water systems must have a program and isolation is the recommend approach. State Six also lacks a statewide program so specific rules and enforcement measures vary across the state making direct comparisons difficult. Worth noting, is that State Six also has an annual testing requirement despite leniency in other aspects of the program.

STATE SEVEN

Backflow prevention assemblies in State Seven must be tested annually and after any repair or alterations to the assembly. Testers must have completed an approved training course and be registered with the state as a cross connection control tester. Plumbing inspections are required every 2 years for high-risk customers, every 10-20 years for residential customers, and every 10 years for public authority customers unless deemed high risk. Inspections can be done by any individual although State Seven highly encourages that inspections be conducted by licensed plumbers or specialized firms. Containment strategies are not allowed, the standard in State Seven is set at isolation. Residential customers have to comply with the inspection components of the cross connection and backflow prevention program, but public education can be provided in lieu of inspections for low hazard residential customers. Additionally, each municipality has the ability to decide how residential cross connections are inspected. All municipal water systems are required to abide by cross connection and backflow prevention rules, private systems like apartment complexes or manufactured housing do not have to follow program rules. State Seven does not have a program to track backflow incidents.

Enforcement in State Seven is handled by a state-level department but there is no dedicated cross connection staff. All components are actively enforced by the state and measures include the sanitary survey process, inspection updates, and the legal enforcement measures that local water utilities are required to have. Water utilities are required to submit reports of their cross connection control activities to the state each year. Noncompliance in State Seven is handled mostly by utilities who have the ability to issue fines or shut off service. Secondary enforcement measures, including a Notice of Violation and consent orders, may also be used to address noncompliance. State Seven does not note regulatory gaps within their program. Standard operating procedures are regularly updated and cross connection control issues are addressed by a standing workgroup.

The programs of State Seven and Michigan are very similar in terms of program features and applicability of regulation. The 10-20 year residential inspection regulation may be a more effective rule than Michigan's 5-10 year cycle in terms of being able to meet inspection standards. Many water suppliers in Michigan are not currently meeting this requirement, which makes the regulation ineffective at protecting the water supply. Whereas, State Seven is able to reliably meet their 10-20 year inspection targets, which makes their rule more effective, despite having a larger timeframe. If the acceptable timeframe is extended, then suppliers would have more opportunities to comply. State Seven also allows low hazard residential customers to receive education instead of inspections, an approach that likely decreases the overall burden of inspections. State Seven's program rules and regulations come from multiple state agencies., For instance, testing regulations and requirements are done by a different organization than inspection requirements. The approach does appear to work well

for this state. Again, this state has an annual testing requirement for all backflow prevention assemblies while Michigan requires testing on a 3-year cycle.

STATE EIGHT

In State Eight, all backflow assemblies must be tested per manufacturer recommendations, but at the very least annually. This testing can be done by an individual with ASSE, Trio, USC, or ABPA certifications. Ongoing plumbing inspections are not required, but initial surveying of customer hazards and potential cross connections does happen. State Eight does allow containment in lieu of isolation strategies but does not disclose when containment is used or provide affected parties with additional information. Single-family residential customers are exempt from the program, but multi-family residential customers, such as apartment complexes, must follow all program rules. State Eight has two different types of cross connection control programs, a required "containment" program and a "comprehensive" program, which is more robust than containment. The containment program, while a requirement, only applies to publicly owned buildings and facilities, such as government buildings and parks. As such, the containment program rules do not apply to the majority of private water customers. In order for the program to apply to all customers it must be upgraded to a comprehensive program and the public water system must have a legal authority to enforce and implement any program components. Such legal authority would be gained through a city ordinance or a user agreement in the case of rural water systems. All community public water systems must have one of the program types, and the state recommends comprehensive programs. However, this leaves the possibility that different water systems are regulated differently based on the type of program that is implemented. Water systems in State Eight must report any backflow incidents to the state.

Enforcement in State Eight is taken on by a division of a state department and they do have a specialized staff member who handles cross connection control. Enforcement is done through sanitary surveys and the legal enforcement measures that water systems are required to have. Water utilities must submit annual reports documenting their cross connection control activities. Noncompliance in State Eight is met with a deficiency mark on the sanitary survey report and, if necessary, noncompliance can also be met with fines and other formal enforcement actions. This state does note that their program has regulatory gaps, namely the exemption of single-family homes. However, expanding the program to single-family residential accounts would take significant funding, staffing, and enforcement resources.

State Eight and Michigan have relatively similar programs on a surface level, but State Eight has some program features that overall makes their program less robust than Michigan's. The exemption of single-family homes from the program is a very key difference, State Eight even recognizes that the majority of their backflow events are from these accounts. Michigan recognizes irrigation systems, including residential ones, as high-hazard areas and does try to regulate them as such. Another notable difference is that State Eight has two different tiers of cross connection and backflow prevention programs, the containment tier which only applies to publicly owned facilities, and the comprehensive tier which is more robust and applies to all customers. If water systems opt for the containment approach, then the majority of private customers are not bound by any cross connection rules, which could pose a serious public health threat. Each system decides which type of program to implement, meaning that not every water customer is held to the same standards and regulations. This could lead to confusion among water customers and decrease compliance. Lastly, it is worth noting that State Eight also has a minimum annual testing frequency, while Michigan only has an annual testing recommendation for high-hazard assemblies.

PART II: CONTRACTOR SURVEY

All three contractors surveyed practice cross connection work in Michigan, as well as some of the other states surveys for this report. Each contractor noted different concerns they have with Michigan's program and how that can affect customers and compliance. Generally, the services provided by these contractors includes conducting surveys of water customer plumbing systems to identify cross connections, managing the notification, review, and tracking of assembly testing, and managing all associated records for the client. As such, the contractors usually employ individuals with plumbing inspection, cross connection, and backflow preventer credentials and company managers who have a strong understanding of the backflow prevention industry.

CONTRACTOR ONE

The representative from this firm spoke at length about Michigan's requirements for residential irrigation systems. These systems are widely considered to be high-hazard assemblies. In Michigan, residential backflow preventers on irrigation systems can go up to 5 years between tests, but commercial irrigation systems must be tested more frequently. A commercial water customer and a residential water customer could have the same irrigation system, but the commercial customer would have higher testing frequency. Contractor One feels as though Michigan is more concerned with commercial installations (boilers, irrigation systems, etc.) than residential even though the systems could be identical. This firm believes that these inconsistencies between residential and commercial customers contribute heavily to confusion and noncompliance and remedying them could greatly improve Michigan's cross connection and backflow prevention program.

CONTRACTOR TWO

Contactor Two echoes some statements made by Contractor One, they both feel as though Michigan is reluctant to give out punishment for non-compliance. This firm also noted a detail of Michigan's program that was prominent in the state surveys, the lack of an annual testing requirement for assemblies. The representative said that most states they work in have an annual testing requirement that is actively enforced. Contractor Two also noted a lack of consistency in enforcement and involvement from county-to-county, which is one of the regulatory gaps that Michigan is aware of and aims to fix. Contractor Two states that Michigan has inconsistent and confusing testing requirements that are not necessarily in line with the state plumbing code. Of Michigan's residential program, this firm said the inspection requirements need more clarity, but that Michigan is positively unique in that the state does enforce residential inspections inside homes.

CONTRACTOR THREE

Contractor Three also commented on Michigan's testing frequency requirement. The majority of jurisdictions that this firm services across the United States and Canada require annual testing of backflow assemblies. Michigan does not, which makes the program less robust and less safe than many others across the country by this aspect. They also note that Michigan has more stringent internal inspection requirements than many other areas they work in. However written requirements do not necessarily translate to actions if they are not consistently enforced. This firm did not provide many criticisms of, or recommendations for, Michigan's program as a whole.

PART III: RECOMENDATIONS AND CONCLUSIONS

Of the eight states surveyed for this report, seven required annual testing of backflow prevention assemblies and the remaining recommended annual testing for all assemblies. All three contactors also spoke critically about Michigan's more lenient testing frequency requirements. This is an area where Michigan is lacking. All assemblies in Michigan, even high hazard ones, can, by rule, go up to 3 years between tests and the state can only recommend annual testing. Residential lawn irrigation systems can, by rule, go up to 5 years between tests. A recommendation would be to move to an all-encompassing annual testing standard, like the other states who were surveyed for this report. This would also conform with manufacturer's recommendations and the plumbing code. Another recommendation would be to amend the tester credential standards to require backflow assembly testers to also be licensed plumbers, meaning individuals who test assemblies could also fix them. This would benefit consumers since they would be able to have a one-stop-shop and would not have to potentially find separate testers and repairers. It would also reduce instances for non-plumbers to illegally repair assemblies. However, this recommendation is not without issues. If Michigan moves to an all-assembly annual testing standard, restricting the number of available testers would be counter-intuitive and result in a significant burden on the market. Michigan and two other states are the only ones surveyed that have a requirement for plumbing inspections. Of the three states with required inspections, Michigan has the second-longest timeframe, by which water customers are to complete an inspection. Inspections are a crucial part of the cross connection control and backflow prevention process, and in tandem with other features, create a more robust program, so Michigan should keep the requirement. A cross connection and backflow prevention program regulated at the state level, such as Michigan, is the most effective for consistent regulation and water safety. The states with many local programs appear to be facing implementation and consistency issues which make the programs ineffective as a whole. Moreover, if only certain localities are bound by regulations the safety of the water supply is at risk from unknown, unregulated cross connections and backflow events.

In comparison with other states in the region, Michigan has a fairly substantial and robust cross connection and backflow prevention program on paper. A comparison table is included in Appendix B. EGLE staff are aware of inconsistencies between different EGLE geographic districts, compliance issues, and regulatory gaps. Addressing those faults will take time, resources, and collaboration between the state, water utilities, outside contractors, and customers. Updating the program in a way that offers the most protection but does not place undue burden on municipalities, suppliers, and water customers will be a difficult balancing act. The comparisons and recommendations in this paper will hopefully serve as a jumping-off point and provide some examples for how to more effectively protect public health.

APPENDIX A

QUESTIONAIRE DISTRIBUTED TO STATE GOVERNMENTS

1. Backflow preventer testing requirements. How often must they be tested? Tester credential requirements?

2. Are ongoing plumbing inspections required at all water customers? Who is responsible for conducting inspections (water utility)? How often? Inspector credential requirements?

3. Is premise plumbing containment allowed in place of fixture/point-of-use isolation? If so, are there any conditions such as a disclosure or notification statement to the customer?

4. Which components of the backflow prevention program (testing, inspections, education) apply to residential customers?

5. How are the various state cross connection rules enforced?

    a. Who in the state is tasked with enforcement? Does your state have specialized cross connection control staff? Any formal training for state staff?

    b. What are the enforcement tools (sanitary surveys or separate process).

    c. Do state rules require the local water utility to have a legal enforcement mechanism (i.e. ordinance)?

    d. Does the state actively enforce all components of the state cross connection rules?

6. What requirements do the local water utilities have to report cross connection control activities to the state? What record keeping requirements go along with this?

7. What action(s) does the state take if noncompliance with the cross connection rules are discovered?

8. Any differences between how water systems types are regulated? Such as large and very small water systems, or publicly owned vs privately owned?

9. Does the state track backflow prevention incidents? Are water systems required to report them?

10. With the goal of identifying and eliminating cross connections in mind, do you feel your state has any regulatory gaps that inhibit effectiveness?

QUESTIONAIRE DISTRIBUTED TO BACKFLOW SERVICE FIRMS

1. Which states do you perform cross connection work in, and how long have you been working in each?

2. Describe the scope of cross connection control work your company provides public water utilities (record keeping, tracking assembly testing, interior building plumbing inspections, enforcement, etc).

3. What account types do you have experience working with (commercial/residential/industrial/etc)?

    a. Do you feel your efforts are effective in controlling backflow at the customer sector you work with?

    b. Do you feel there are customer sectors that pose a backflow risk that are not being addressed?

4. From your perspective, how do the assembly testing requirements in Michigan compare to other states? Are there differences in frequency, targeted accounts, tester credential requirements, enforcement?

5. How do interior plumbing inspection requirements in Michigan compare to other states? Are there differences in frequency, targeted accounts, inspector credential requirements, enforcement?

6. What kind of records do you provide following inspections or testing? Does this change depending on the state?

7. Do training offerings on cross connections differ between states? How does Michigan compare? Are there specific topics you think are covered particularly well or poorly?

8. What level of interaction do you typically have with states and your contracted water systems? Do you feel the level of state involvement in Michigan is adequate to effectively control backflow?

9. Are there any states with particularly effective/ineffective enforcement methods of cross connection rules? If so, how do they differ?

10. Please comment on why or why not containment of customer piping is sufficient to protect public health.

11. In states that utilize a containment approach, what additional efforts are needed to protect public health and who is best suited to conduct those activities?

12. With the goal of identifying and eliminating cross connections in mind, do you feel Michigan has any regulatory or implementation gaps compared to other states? What changes would you suggest are made if any?

APPENDIX B

COMPARISON TABLE BETWEEN STATES

	Michigan	State One	State Two	State Three	State Four	State Five	State Six	State Seven	State Eight
Annual testing frequency	X (Annual recommendation for high hazard)	✓	✓	✓+ (Annual testing and 5-year rebuild)	✓	X (No testing requirements)	✓	✓	✓
Required plumping inspections	✓ (5-10 years, annual for high hazard)	✓+ (Every 3 years)	X	X (Varies by utility)	X	X	X	✓ (10-20 years, 2 years for high hazard)	X
Isolation required	X	X	X	✓- (Containment is likely happening)	X (Containment is the standard)	X	X	✓	X
Residential customer requirements	✓+	✓+	✓+	✓ (Specifics can vary by locality)	X (Residential accounts are exempt)	✓- (When a program is in place)	✓- (When a program is in place)	✓+	✓- (Single-family residential customers are exempt)
Specialized staff w/ training	✓	✓	✓	X	✓ (Regional offices)	X	✓ (Local officials)	X (No dedicated cross connection staff)	✓
Sanitary survey used	✓	✓	✓	✓- (self-enforcement)	✓	✓- (When a program is in place)	X	✓	✓
Utility required to have legal enforcement mechanisms	✓	✓	✓	X	X	✓- (When a program is in place)	✓- (When a program is in place)	✓	✓

	Michigan	State One	State Two	State Three	State Four	State Five	State Six	State Seven	State Eight
Active state enforcement	✓- (Attempts to)	✓	✓	X (Local government)	✓- (Attempts to)	X (No statewide program)	X (No statewide program)	✓	✓
Utility required to report cross connection control activities	✓+ (Annual survey)	✓ (Triannual survey)	X	X	X	X	X	✓+ (Annual summary)	✓+ (Annual report)
Non-compliance actions	✓	✓+ (Fines)	✓+ (Can remove service)	✓- (Can vary by locality)	✓	✓	✓- (Can vary by locality)	✓	✓
All system types are regulated the same	✓	✓	✓- (Different sanitary survey frequencies)	X (Regulations vary between localities)	X	✓- (When a program is in place)	X	X (Only municipal water systems are regulated)	X (Most private systems are not regulated)
Tracks BF incidents	X	X	X	X	X	X	X	X	X
Water systems required to report BF incidents	✓	✓	✓	X	✓	✓+ (Must report within an hour)	X	X	✓ (Notify for loss of pressure events)

Key:

X	Program does not have this feature.
✓-	Program has this feature, but it may be lacking.
✓	Program has this feature.
✓+	This program feature is robust.